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Railway & Commercial Gazette

Vol. CCXLII No. 6177

LONDON, JANUARY 8, 1954

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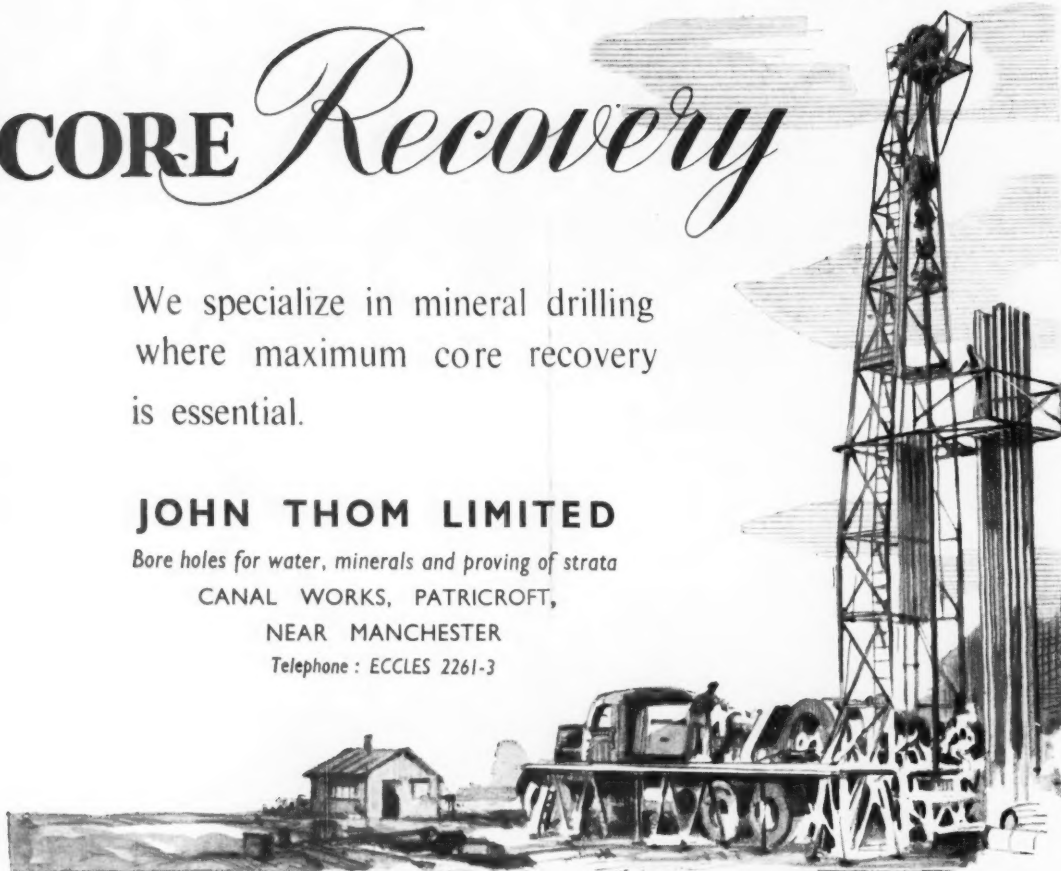


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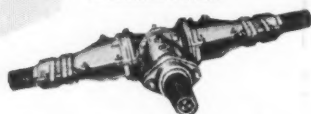
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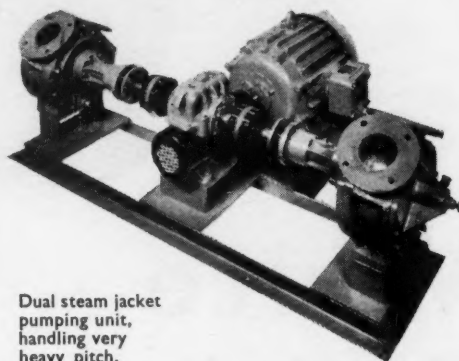


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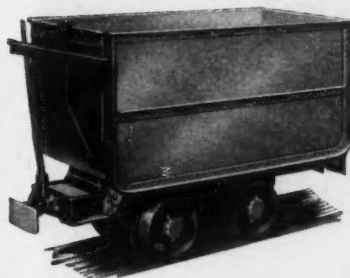
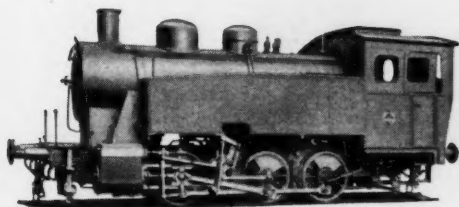
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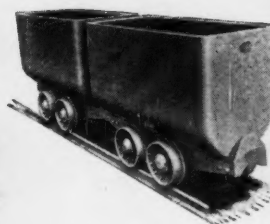
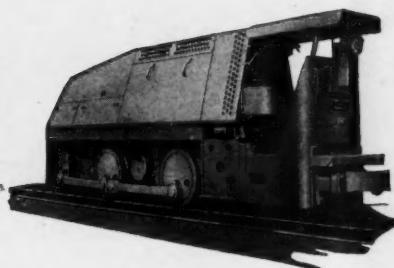
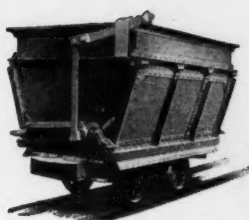
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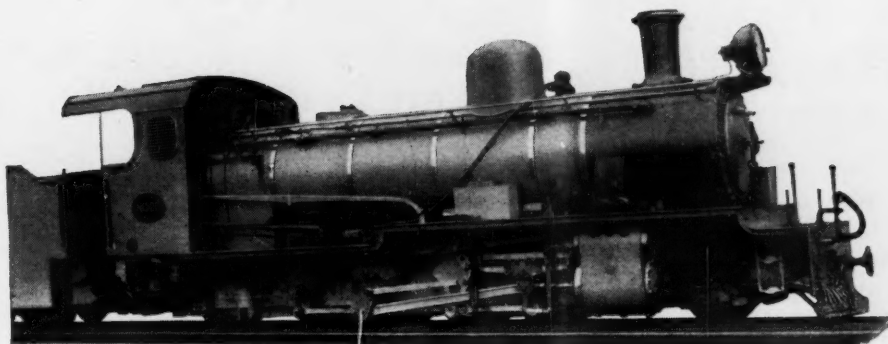
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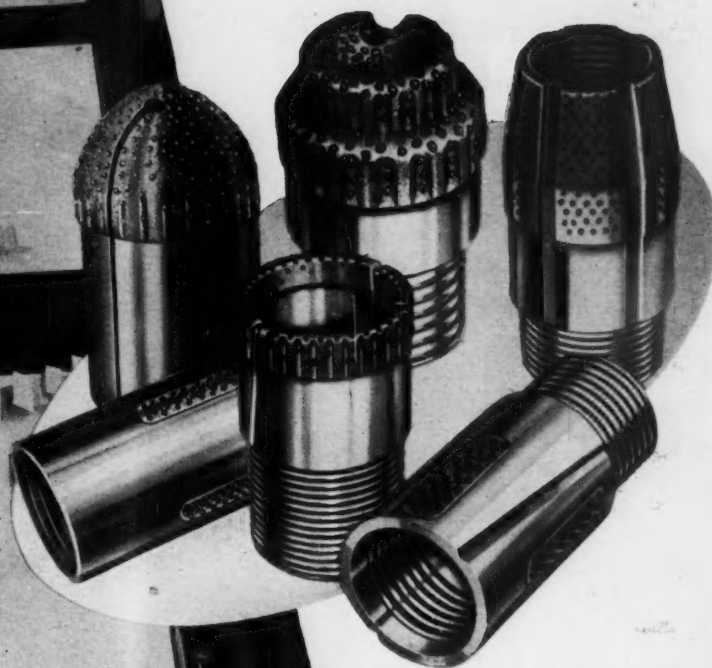
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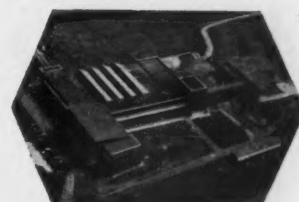
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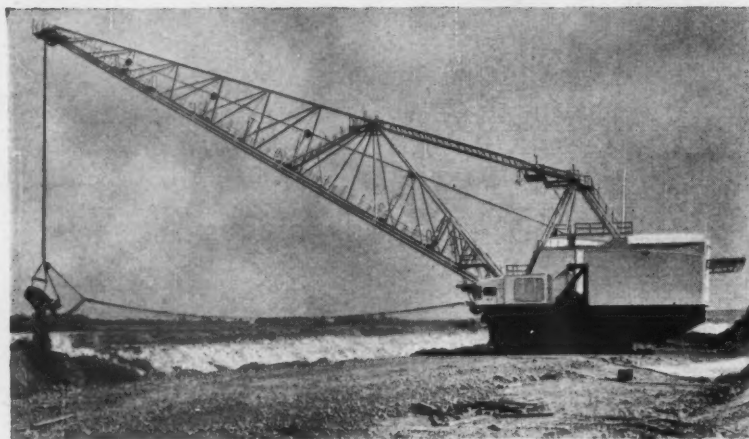
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Published by The Mining Journal Ltd., at 15 Wilson Street, Moorgate, London, E.C.2. MONarch 2567 Subscription £2 per annum

NOTES AND COMMENTS

Sterling Shortage Draws Russian Gold

The Soviet Union's recent gold shipment to this country, referred to very briefly in these columns last week, is now believed to be the result of an appreciable deficit in Russia's balance of payments with the sterling area group of countries.

At first it was thought that the sales of Russian gold were the means by which the new Soviet Regime intended to implement its declared policy of raising living standards which had suffered for so long under Stalin's policy of concentrating all available resources on the strengthening of the capital goods industries in the U.S.S.R. While this conclusion cannot, even now, be wholly dismissed, the magnitude of the inflow of gold, silver and other precious metals from Russia in recent months presupposes reasons more compelling than merely filling the pipelines to Russia with consumer goods.

The most telling evidence to support the belief that these recent sales were directly connected with the Soviet Union's desire to obtain supplies of sterling is that her earnings of sterling from such basic exports as grain and timber to the United Kingdom declined sharply last year. In the first 11 months of 1953 earnings of sterling from grain exports were less than £3,300,000 as against over £33,600,000 in the corresponding period of 1952. But the lower sterling earnings which these figures represent do not constitute the only significant pressure upon Russia's supplies of sterling. Substantial down-payments have been required to service Russia's recent orders to British shipbuilders, while it is also known that she has been paying sterling for a wide range of consumer goods.

How much longer this country can expect to benefit by Russia's shortage of sterling depends on the extent to which the Soviet bloc of countries can improve their balance of payments with the sterling area and, in particular, the extent to which Russia can expand her sterling earnings by increased sales of petroleum, timber and other goods such as agricultural machinery. While it is extremely difficult to assess whether the Soviet bloc of countries, as a whole, are improving their external balance of payments, in so far as the Soviet Union is concerned, the increasing scarcity of sterling is easing her task of building up export

earnings. For example, Russian oil has now made its appearance in world markets for the first time since before the war and already it has captured the market in Iceland, which can no longer afford sterling for oil since this country banned the import of Icelandic fish. Scarcity of sterling is also understood to be the reason for the decision taken by Finland to switch her oil purchases to Russia.

Observers in the United States have, of course, been watching these interesting developments in the international bullion market and Mr. Harold Stassen, director of the U.S. Foreign Operations Administration, declared in Washington earlier this week that these recent Soviet gold shipments were indicative of the success of the West's restriction on trade with the Soviet bloc. His estimate of the total value of Soviet shipments to Western sources was that it was worth more than \$200,000,000. This figure is considerably higher than any estimates made on this side of the Atlantic, but since it is not the practice of the Bank of England to disclose its bullion transactions with other central banks, it is impossible to say, with any degree of accuracy, how much gold Russia has sold to Britain in the past few months, and how far this country's gold and dollar reserves have been augmented by these shipments. Be that as it may, there is no question of our gold and dollar reserves not benefiting and it is estimated that of the \$114,000,000 surplus earned by the sterling area in December, no less than \$50,000,000 was derived from the Soviet gold consignments.

Facilities for a Degree Course at Camborne

It has long been a matter for regret that facilities have not been available to students at the Camborne School of Mines for taking a University degree course. It is, of course, true that in most parts of the world the Associateship Diploma of the School has a standing virtually equivalent to that of a degree and that the letters A.C.S.M. after a mining man's name have long been a recognized and respected hallmark. Nevertheless, candidature for some mining appointments, more particularly in Government service, and in the academic field, is only possible once a University degree has been obtained, and this fact has naturally had the effect of diverting elsewhere a certain

number of men who might otherwise have preferred to study at Camborne.

Following recent approaches by the School to London University, this difficulty has now been resolved through the granting, by the University Senate, of recognition to the Camborne School of Mines, for the purposes of training students externally for the London B.Sc. Degree (Engineering) in mining. These facilities will come into operation next September.

Students wishing to take a degree course at Camborne will still have to fulfill the qualifying conditions required by London University before they can sit for the various parts of the examination, which means that the acceptance of a student at Camborne for the School's Associateship Course does not necessarily imply qualification to sit for the London degree. Indeed, quite a number of the students who have been going to Camborne in recent years, more particularly those from overseas, have lacked these qualifications and would have needed to attain Higher School Certificate standard or equivalent before being allowed to sit for Part I of the degree examination. Moreover, it is not proposed to provide facilities for reaching this required standard at the Camborne School, so that students lacking the necessary entrance qualification will presumably need to obtain this at one of the local technical colleges, and it is not clear from the information which we have at present whether the School would allow such students to obtain this simultaneously with doing their first year's work at the School, or whether (as is the case with the Royal School of Mines) they would require students to obtain this first, which might mean delaying their entry to the School by a year.

In any event these degree facilities remain in a sense ancillary to the main purpose of the School, which is to put students through the School's Associateship Course with a view to obtaining the A.C.S.M. Diploma. The Institution of Mining and Metallurgy does, of course, already grant exemption from its Associateship examination to those who have received the School's Diploma.

The new facilities do not in any way affect the existing arrangements for providing a fourth year (post A.C.S.M.) course for those wishing to specialize in geology, for whom facilities already exist for taking an external B.Sc. Honours Degree in Geology at London University.

Incidentally, old alumni of the School who have not been back to Cornwall recently may not be aware that under the School's new foundation now approved by the Ministry of Education, the old, rather cumbersome, official title of the School (which was "The School of Metalliferous Mining (Cornwall)" and which dated from the time of the amalgamation of the three original schools at Camborne, Redruth and Penzance) has now been changed to "The Camborne School of Metalliferous Mining." For many mining men the world over, the title will however probably remain what it has already been so long—simply the "Camborne School of Mines."

Bright Prospects For South Africa in New Year

In spite of a labour scarcity gold production in the Union reached 1,025,000 oz. in July, the highest level in nearly seven years, and 22 mines have gone into uranium production. Thus, with two of the most saleable commodities backing her economy—gold and uranium—South Africa enters 1954 with ample reason for satisfaction with economic prospects. Yet, the one adverse factor which may cast a very large shadow over an otherwise healthy economic picture is the continuing shortage of foreign capital for investment in South Africa, and it will be interesting to see by what means the Government hopes to expand the capital inflow to the Union during the current year.

Canada

(From Our Own Correspondent)

North Bay, December 17.

The right of the private individual to acquire and hold gold has become a moot question throughout Canada and the United States. The pledge of the present American Government suggested during the election campaign has not been forgotten. It pointed to a return to some form of gold standard. Close observers in this country believe a first step may be to permit private gold holdings. Opinion is widespread that such a development would enlarge the distribution of the precious metal and would tend toward greater stability, and an increase in value more in keeping with current value of commodities in general.

Base metal producers in Canada are facing the future with caution. The agitation at Washington is causing worry, aimed as it is at creating a sliding scale anti-dumping duty to insulate the domestic mining industry of the United States from the competition of foreign metals. One hopeful aspect at this time is the fact that important producers of base metals within the United States itself are opposed to such a measure. This opposition is based upon the fact that the natural resources of metals within the United States is insufficient for growing industrial requirements.

A recent statement by the Canadian Council of the International Union of Mine, Mill and Smelter Workers points out that the heavy fall in the prices of lead and zinc has already led to the closure of 22 mines in British Columbia. The Council asked the Government to take steps to permit unhampered trade with all countries willing and able to buy Canadian base metals, to grant assistance based on mine production costs, to build a Government lead and zinc custom smelter in West Canada, and to remove all restrictions on the free international sale of gold.

DEVELOPMENT PROJECTS

MacLeod-Cockshutt Gold Mines is providing an outstanding demonstration of efficient mining and milling. The plant is operating at a little over 1,400 tons per day. After allowing for loss in recovery, the net profit is averaging about \$1 per ton.

A new concentrator designed to handle 700 tons per day is in an advanced stage of construction on the property of Quebec Copper Corp. near Eastman in the Eastern Townships district of Quebec. Funds for mine development and mill construction are being provided by East Sullivan Mines and Sullivan Consolidated Mines.

The ten mile, 25 ft. diameter tunnel has been completed by Aluminum Co. of Canada on its Kitimat project in British Columbia. The operation involved removal of 2,300,000 tons of rock and was accomplished in 21 months.

The *Financial Post* states that work could be started next summer on a new metallurgical and chemical venture in Northern B.C. if the Provincial and Federal Governments agree to the provision of water power. Formal applications will be made to both Governments early in 1954 by the directors of Quebec Metallurgical Industries and a subsidiary of Frobishers, and discussions will be held soon with four or five large chemicals and metals enterprises interested in the venture, of whom the only name publicly mentioned is Monsanto Chemical Company.

The project would aim eventually at developing 4,500,000 h.p., and cost of the initial stage is estimated at \$12,000,000 to \$15,000,000. It is understood that at least one of the companies seeking participation with the Frobisher interests has offered to provide the whole sum, although the proposed basis of financing precludes domination by any one company.

The Port Pirie Smelters

The Broken Hill Associated Smelters Pty. Ltd. was established jointly by three Broken Hill mining companies in 1915 to provide at Port Pirie a plant capable of treating to the final stages the entire lead concentrate output of the Broken Hill field. Within the Port Pirie plant, developments in method and equipment have kept pace with current practice, until production now proceeds at record levels while further development is in hand. The following article presents a précis of the methods used at Port Pirie, and gives the sequence of refining operations in some detail.

The Broken Hill Associated Smelters Pty. Ltd. was formed in May, 1915, as a joint venture by three Broken Hill mining companies, and the purpose of the alliance was to provide in Australia a plant capable of treating to finality the whole output of lead concentrates from the Broken Hill field. Similar considerations in regard to the treatment of the zinc concentrates from the same field led to the almost contemporary establishment of the electrolytic zinc industry at Risdon, Tasmania, by the Electrolytic Zinc Company of Australasia Ltd.

At Port Pirie, South Australia, one of the original partners in the formation of B.H.A.S. already had in operation a lead smelting and refining plant, and this formed the basis for the operations of the new company. The site was a convenient one as it provided the nearest sea port to the Broken Hill field and immediate steps were taken to modernise the plant and increase its capacity. This programme has proceeded almost without interruption since the inception of the company, and to-day the plant is one of the most modern, and certainly the largest single producer of lead in the world.

The regular supply of high grade lead concentrates, tabled overleaf, and the immenser resources of the Broken Hill field have inspired the development of a mass-production type of metallurgy in which large operating units and continuous processes are featured.

The first and perhaps the most outstanding contribution to this development was the conversion of the old refinery from a series of batch processes to a single continuous process for lead refining. This was completed in 1932

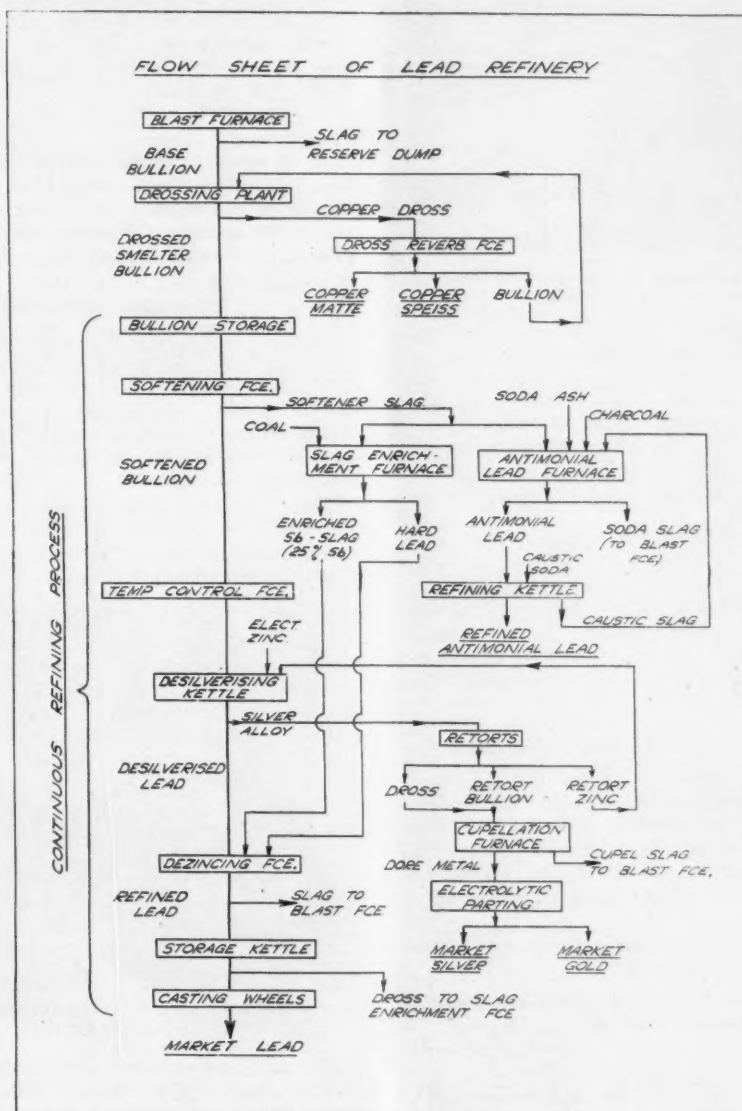
and was followed by a complete re-organisation of the roasting and sintering sections of the plant which was completed in 1940.

As part of this development two 10 ft. wide machines of the Dwight-Lloyd type replaced 13 old machines of the standard 3 ft. 6 in. width. The new machines when installed were the largest of their type in the world.

Improvements in the blast furnace department which had been proceeding almost continuously from 1915 onwards,

finally culminated in the building of the now well known Port Pirie type lead blast furnace, shown overleaf, featuring chair-shaped bosch section and a double row of tuyeres, one row being mounted in the necked-in section where the furnace width is 5 ft., and the second row being mounted higher in the furnace shaft where the width is 10 ft. The whole of the furnace shaft is built of mild steel water jackets through which fresh water is circulated.

The final design was arrived at after four successive modifications of a standard lead blast furnace and the first of the new units was blown in in January, 1947. This furnace had a capacity of 250 tons of equivalent market lead per day and was followed by a similar unit which was completed the next year. A third furnace of basically similar design, but of

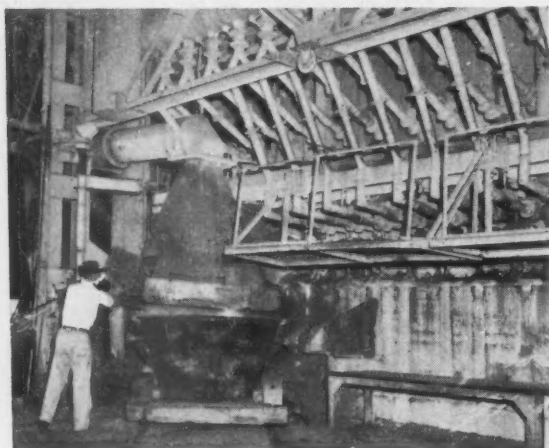


lower capacity, was added in 1952.

Apart from a short period during World War II the full capacity of the newer plant units has never been tested, in fact, in common with conditions in many Australian industries in the period following World War II, the

plant has operated at considerably less than capacity. During the last 12 months, however, there has been a marked increase in productivity on the Broken Hill field, and production at Port Pirie is now proceeding at record levels.

Despite the demands which the high production rate is making on the staff and equipment, further developmental work is in hand.



Port Pirie type blast furnaces with tuyeres, lead well ladle and provision for fume collection

A new contact sulphuric acid plant with a designed capacity of 50,000 tons of 98 per cent acid per year has recently been brought into operation, a third 10 ft. wide roasting and sintering machine of the Dwight-Lloyd type but operating on the updraught principle is under construction, and modification of the refinery circuit, to include vacuum dezincing and nitre refining in place of the present final refining practice, has reached an advanced stage of pilot scale development.

Descriptions of the plant and processes at Port Pirie have been the subject of a number of papers, the most recent of which are contained in Volume IVB (Extractive Metallurgy in Australia—Non Ferrous Metallurgy) of the Fifth Empire Mining and Metallurgical Congress publications. However, for those who are not familiar with existing operations at the plant, the following summary may be of interest.

ORE RECEPTION AND CHARGE ASSEMBLY

Lead concentrates are railed from Broken Hill, a distance of 255 miles, in 30 ton, non-tipping ore trucks. The concentrates are unloaded by an overhead grab and stored in individual bins, according to type, at the charge assembly plant, or are stockpiled on convenient sites within the works, which cover an area of approximately 95 acres, excluding the slag dump.

Typical analyses of the various types of concentrates received are shown in the table below:

Broken Hill Associated Smelters—Typical analyses of concentrates received

Source and type of concentrate	Pb %	Ag oz. ton	Zn %	S %
North Mine Gravity	79.5	25.6	2.0	13.7
North Mine Flotation	62.5	43.2	7.5	17.3
South Mine Gravity	76.1	27.4	2.8	14.3
South Mine Flotation	70.0	56.9	6.2	16.5
Zinc Corpn. Flotation	76.3	16.6	3.8	15.7

Fluxes such as lime sand, ironstone, silica sand and zinc plant residues (from the Electrolytic Zinc Company of Australasia's plant at Risdon, Tasmania) are received by ship or motor transport and after unloading are conveyed

to the charge assembly plant bins and stored alongside the concentrates. Blast furnace granulated slag from an extensive storage dump is also one of the components of the charge; this acts as a diluent in the roasting and sintering operations, as well as having a recoverable lead content.

Concentrates and fluxes are drawn from the storage bins in pre-determined proportions according to the type of furnace charge required and the charge components are collected on a conveyor belt which discharges on to No. 1 mixing table at the head of the roasting and sintering plant.

A typical charge going forward to the roasting and sintering plant is shown in the table below:

Roasting and Sintering Plant—Charge Composition

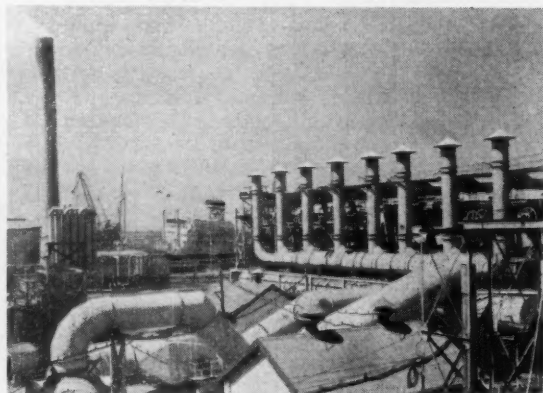
Material	Proportion %	Pb %	Pb in Charge %	S %	S in Charge %
Mixed Lead Concentrate	60	74.7	44.82	15.9	9.54
Silica Sand	2	—	—	—	—
Lime Sand	6	—	—	—	—
Ironstone	2	—	—	—	—
Zinc plant residues	8	4.5	0.36	4.5	0.36
Return Slag	22	2.7	0.55	1.8	0.40
Total	100		45.73		10.30

In the above table the analyses shown for the returned slag does not represent current blast furnace slag which is sent to the reserve dump at 1.4 per cent Pb., but is material which has accumulated in the past when the reduction efficiency was not as high as it is to-day.

ROASTING AND SINTERING

As mentioned previously two Dwight-Lloyd machines are employed in this section and a third is under construction. The present machines are 10 ft. wide and 50 ft. long over the windboxes, and the new machine will be the same width but almost twice the length. This machine has been designed to incorporate updraught sintering instead of the normal downdraught.

There are three mixing tables in the roasting and sintering plant and these are arranged with appropriate belt conveyors to provide maximum flexibility for the plant, so that either semi one-pass or two-pass roasting may be used.



A section of the plant looking towards the wharf. The baghouse is on the right

Normally semi one-pass roasting is employed and the charge is ignited at the head of each machine by passing under an oil-fired ignition box.

At the present time roaster gas is sent to atmosphere after the solids have been removed in a baghouse, and no attempt is made to recover sulphur dioxide for sulphuric acid manufacture. When the third machine is completed at the end of 1954 a large proportion of the sulphur dioxide will be available from it for acid manufacture in the new

sulphuric acid plant, which is at present operating on gas from a sulphur burning unit.

BLAST FURNACE SMELTING

The charge to the blast furnaces consists of sinter and coke, together with a small proportion of pig or scrap iron and returned leady residues (slags, skimmings, secondary metals, etc.).

Coke for smelting is obtained from the south coast of New South Wales and is screened and blended for use in the blast furnaces.

Sinter, coke and other charge materials are conveyed to the blast furnace feed floor by a Telpher system and the furnaces are all self-feeding from overhead hoppers.

No forehearth is used on the furnaces at Port Pirie, the lead bullion from each furnace flowing continuously through a syphon tap and lead well into firebrick lined ladles of 10 ton capacity, which are then delivered direct to the dressing floor where copper is removed. Slag is tapped intermittently through a breast at the end of each furnace and after passing through a settler pot it is granulated and conveyed to the slag reserve dump by motor transport.

It has been the custom at Port Pirie for many years to run high zinc slags with the ultimate objective of using the slag as raw material for a zinc recovery process, but to date activities have not proceeded beyond pilot plant work.

All fume from the blast furnaces, and that from the roasting and sintering plant also, is filtered in baghouses before discharge to atmosphere. The fume catch is water leached for the extraction of cadmium which is subsequently precipitated on metallic zinc, melted with caustic soda, and finally distilled to yield a refined market product.

REFINING

The flow sheet of the refining operations is shown in the illustration on page 43. De-copperised lead bullion from the dressing plant is delivered molten to the refinery by ladle car, and is pumped to the first of two bullion storage kettles which provide a reservoir for the refinery system. A valve in the outlet from the second storage kettle regulates the rate of flow to the first unit in the continuous system which is the softening furnace.

In the continuous softening furnace the lead bullion is agitated by compressed air as it flows through the furnace and arsenic and antimony together with a portion of the lead are oxidised and form a fluid slag. This slag is tapped intermittently and is reduced with soda ash and charcoal in another reverberatory furnace to produce crude antimonial lead, which is subsequently refined and blended into market alloys.

During part of the year the alternative treatment for this slag in the slag enrichment furnace is practised. The reason for this is to provide a stock of enriched antimony slag for fluxing the zinc oxide formed in the dezincing furnace, which is the final unit in the continuous refining process.

When, in the near future, a continuous vacuum dezincing process and a continuous nitre refining process replace the present dezincing furnace, there will be no need for this enriched antimony slag and the alternative process will cease to operate.

Lead bullion from the softening furnace passes through a temperature control furnace to the continuous desilverising kettle where silver and gold are removed by zinc as in the Parkes Process, but by an ingenious design of kettle the process is made continuous.

The kettle is dipped periodically when the silver content of the top alloy layer reaches 6,000 ozs. per ton and fresh zinc is added. The dip alloy which contains lead and zinc as well as silver and gold is worked up in the usual way by

retorting, cupellation and electrolytic parting to produce silver and gold of marketable fineness, and to recover lead and zinc for return to the circuit.

Desilverised lead is finally treated to remove zinc in the dezincing furnace, which is similar in design to the softening furnace and likewise air agitated, and refined lead from this furnace then passes to the storage kettle ahead of the Newnam casting wheels.

Refined lead (99.99 per cent +) is cast into 56 lb. bars on two Newnam wheels. The bars are picked from the wheels by hand, stacked in sets of 60 bars, and then transported to the shipping wharf which adjoins the refinery.

Electrically operated cranes which command the wharf storage area are used for loading the lead to ships' holds. As these cranes are capable of raising three unit stacks equivalent to 4½ tons at each lift, very high loading rates are possible.

Approximately 75 per cent of the output of The Broken Hill Associated Smelters Pty. Ltd. is shipped overseas, principally to the United Kingdom, so the industry plays quite an important part in providing valuable overseas exchange for further development of the Australian economy.

Obituary

HAROLD ABBOTT TITCOMB

The death is recently announced of Harold Abbott Titcomb of Farmington, Maine, U.S.A., at the age of 79.

Mr. Titcomb, who first came to England in 1892, was much averse to publicity, but was widely known to two generations of British and American mining men for his profound knowledge of ore deposits, of ore sampling and of ore estimation.

Graduating from Columbia School of Mines in 1898, he became a Member of the American Institute of Mining and Metallurgical Engineers in 1899 and of the Institution of Mining and Metallurgy in 1908.

In his early years he was associated with the Guggenheims in mines in U.S.A. and Mexico, including Esperanza. From 1914 to his virtual retirement in 1933 he travelled extensively and examined mines and consulted on behalf of the Selection Trust Limited.

A great part of his life was spent in nurturing goodwill between English speaking peoples and in later years his hobby of archery brought him frequently to England, where he was elected President of the Royal Toxophilite Society in 1943.

Mr. Titcomb is survived by his widow—formerly Miss Ethel Brignal of Wallington, Surrey, and by a younger son and daughter. His eldest son, Jack—a promising geologist—was killed on active service at Luzon in the Philippine Islands during the last war.

Mr. A. Chester Beatty, Senr., writes:

Harold Abbott Titcomb was a wonderful man. I have known him nearly 60 years since we were students together at the Columbia School of Mines and I have never met in my life a finer character.

Able, honourable and kind, he had a deep instinctive reserve and modesty which made him keep his name out of print but he was associated with the building up of many great mines and businesses. He had a hand in Esperanza (Mexico), Northern Rhodesia and Trepca (Yugoslavia) and many other enterprises. In 1914 he was associated with me as a director in the original Selection Trust and remained in association until his retirement in 1933. I believe he was as near a perfect human being as one would ever find among ones friends and his departure comes as a great wrench.

Properties and Occurrences of Vermiculite

The vermiculite minerals are of secondary origin and may be formed either by direct hydrothermal means, by weathering of biotite or phlogopite, or by a combination of these two agencies. Many varieties of the vermiculite minerals have been discovered in several countries and in the following article, condensed from U.S. Bureau of Mines Information Circular 7668 by O. S. North and H. P. Chandler, commodity specialists of the Construction and Chemical Materials Branch of the Minerals Division, the properties and occurrences of vermiculite are given, together with current production statistics and methods of exploitation. The article concludes with interesting remarks on exfoliation, which constitutes the principal commercial value of the mineral. Readers may also wish to refer to articles in *The Mining Journal* of September 16 and 23, 1944, and February 5, 1949, which are highly relevant.

The vermiculite minerals are hydrated magnesium-aluminum silicates. They show the characteristic micaceous structure of basal cleavage and occur as soft, pliable, inelastic laminae. Vermiculite crystallizes in the monoclinic system, and the crystal faces are often marked with triangular lines at 60 deg. and 120 deg. Its hardness ranges from 1.5 to 3, and the specific gravity of crude material, as mined, is about 2.5. The fusion point is approximately 2,466 deg. F.

Completed X-ray studies indicate that vermiculites constitute a specific type with a definite structure differing from that of mica or chlorite. From the tabulation of a number of analyses, Gruner¹ has stated that their average composition can be represented by the formula $22\text{MgO} \cdot 5\text{Al}_2\text{O}_3 \cdot \text{Fe}_2\text{O}_3 \cdot 22\text{SiO}_2 \cdot 40\text{H}_2\text{O}$, whereas J. B. Myers² gives the structural formula as $(\text{OH})_2(\text{Mg}, \text{Fe})_3(\text{Si}, \text{Al}, \text{Fe})_4\text{O}_{10} \cdot 4\text{H}_2\text{O}$. The indefinite and variable chemical composition of vermiculite is indicated by the following ranges in the percentages present of each of the major components: Silica, 31-41; alumina, 10-17; iron oxides, 5-22; magnesium oxide, 11-31; and total water content (free water and water of crystallization), 4-21. Nineteen varieties of vermiculite have been identified and listed.

Vermiculite expands when heated, giving off considerable water. This expansion or exfoliation is believed to be a mechanical separation of the layers when the contained water is converted into steam. The increased volume due to exfoliation ranges from 6 to 20 times that of the unexpanded material, the increase in bulk volume of commercial material usually being 8 to 12 times.

GEOLOGIC OCCURRENCE AND ORIGIN

Vermiculite commonly is associated with intrusions of ultrabasic igneous rocks, such as dunites, serpentines, peridotites, and pyroxenites. It may occur as a zone or envelope of alteration products surrounding the basic intrusion or as irregular veins within the intrusive body. Quartz, feldspar, corundum, apatite (particularly fluorapatite), biotite, chlorite, asbestos, and talc are typical associated minerals.

In a few known occurrences vermiculite is not associated with a basic rock, but the quantity of the material is not large, and its exfoliation properties are inferior or almost wholly absent. It is likely that vermiculite minerals have been formed by a number of different geological processes. In all cases, however, vermiculites are secondary minerals resulting from hydrothermal alteration and weathering. The compositions of the rocks or primary minerals from which a vermiculite is derived, the chemical nature of the altering solution, and the degree of alteration account for the variation in chemical composition and physical properties of the many varieties.

In all, vermiculite has been reported in 12 states of the United States, and commercial production is known to have come from seven. The deposits vary considerably in composition and variations occur also within a single deposit. The largest known deposit of vermiculite in the United States occurs near Libby, Montana, where reserves are estimated at 25,000,000 to 100,000,000 tons, and about 2

tons of material are mined for each ton of finished concentrates shipped. Deposits range from 30 per cent to as much as 95 per cent vermiculite content. Production in Wyoming, Nevada, California, and the Carolinas has been reported.

Vermiculite has also been found in the Ural Mountains in the U.S.S.R., in the Union of South Africa and Tanganyika, and at Bulong and Kalgoorlie in the south-eastern part of Western Australia, as well as in Japan.

Only the Russian and South African deposits are known to have been worked to any extent on a commercial scale. Some years ago the Australian deposits were said to have been under development for use in the local market, but no further pertinent information has been forthcoming. In the Ural Mountains of Soviet Russia vermiculite is associated with dunite and pyroxenite intrusions, which are widely known as sources of platinum. Small tonnages of low-grade Russian vermiculite have been received in the United States.

Vermiculite is widespread in British colonial territories in Africa, while it was first reported in the Union of South Africa from the corundum fields of the northern and eastern Transvaal, where it occurs as a thin casing around the corundum reefs.

Late in 1950 a deposit of vermiculite of commercial interest was located near Stanleyville, Canada. Reserves were estimated at 300,000 tons.

The following table on world production of vermiculite was prepared by the U.S. Bureau of Mines. It shows production for the three years 1948, 1951 and 1952, in tonnes.

Country	1948	1951	1952
Australia	153	56	63
Egypt	—	637	60
India	—	236	—
Kenya	—	3	—
S. Rhodesia	16	502	—
Union of South Africa	12,527	24,507	36,213
United States	125,767	189,608	189,515
	138,463	215,549	226,000

In addition to the countries listed, vermiculite is produced in Brazil and the Soviet Union, but as data is not available from these sources no estimates can be included in the published total. Returns are not yet available for India, Kenya and Southern Rhodesia, and thus the world total production tonnage for last year must be regarded as an estimation only.

MINING AND MILLING

Although underground mining of vermiculite was practised at some mines in the past, virtually the entire quantity now being produced is from opencut operations. The procedure described below is followed in mining and milling the vermiculite at the Libby, Montana deposits.

Little stripping of overburden is necessary, and the vermiculite, which is soft and spongy, is dug and loaded into motor trucks by power shovels working on 18 ft. benches. Only the waste material, a rock that is mostly irregularly occurring syenite intrusions, must be drilled and blasted. As the quality of the ore varies from place to place, it is mined selectively as high grade, medium, or low grade.

Preliminary screening is done near the mine. The vermiculite, which is effectively disintegrated during digging and loading, passes through the 12 in. grizzly at the primary plant. A double-deck, vibrating grizzly with 4 in. and 2 in. openings effects the primary separation, oversize from the top screen usually being rock waste. The 2 in. oversize, depending on the quality of the ore, may be either wasted or ground in a hammer mill and rescreened. All of the material passing the 2 in. screen is fed via a vertical chute into a 24 in. wide, 1,300 ft. long, belt conveyor, which delivers it to the mill. A section of the conveyor is below ground, and the remainder is enclosed, permitting continuous operation during rigorous winters.

At the mill the material first is dried in rotary, oil-fired, parallel-flow kilns. The charge is subjected to a heat of 400 deg. to 600 deg. F. for a short time. Care is exercised to avoid temperatures high enough to disturb the combined moisture content thereby retarding full expansion. Less than 10 per cent of the original quantity of free moisture is still present at the point of discharge from the drier. The dried material is screened to size in a battery of vibrating screens before concentration. The most successful exfoliation occurs when the material fed to the furnace is dry, uniformly sized and reasonably free of rock and other matter.

PRINCIPLE OF EXFOLIATION

In the crude state vermiculite has few uses, its principal commercial usefulness depending on its ability when heated to exfoliate into a lightweight, bulky material of specific properties and particular applications. Commercial exfoliation of vermiculite is accomplished by passing a graded material through one of several types of kilns. Usually the kiln is heated with oil or gas, although electricity or pulverized coal also may be used.

The properties desired in the expanded material are light weight, toughness, and complete expansion. The exfoliating properties of vermiculites vary, not only from deposit to deposit but within a single body; some expand more than others, the temperature at which expansion begins or reaches its maximum varies, and still others decrepitate when expanded. Therefore, considerable fuel or power may be saved if before using material from individual or composite sources the temperature is determined at which the greatest exfoliation occurs while maximum toughness is retained. Thus, materials from various sources may be advantageously blended.

Exfoliation is produced most successfully at temperatures between 1,600 deg. F. and 2,000 deg. F. The charge is subjected to heat for four to eight seconds and then cooled rapidly. This imparts pliability and toughness to the expanded particles, prevents scorching or burning bags, and permits the necessary subsequent manual handling. If the kiln temperature is too high or particles are held too long in the heat zone, they show excessive drying out.

Several types of exfoliators are in use, and although they vary in structural details they are similar in principle. The expander in general use in the United States is a modified vertical shaft furnace heated by oil-fired burners. The charge fed into the top of the furnace is impeded in falling by staggered baffles and exfoliates upon coming in contact with heat from the burners. The exfoliated material cools rapidly in its fall from the heated zone to a bucket elevator below, which carries it to a cyclone airlift. The entire operation requires only a few minutes.

A second type of expander consists of a double-wall cylinder with an air space between the walls. The inner cylinder contains conical baffles that impede the fall of the particles, which are charged in at the top of the furnace, and another apparatus consists of a kiln in which a hot, tangential blast creates a vortex of ascending gases that picks

up the mineral and carries it upward through progressively hotter zones and eventually to the highest level of the kiln. Most commercial furnaces have rated capacities of over seventy 4 cu. ft. bags of finished material per hour.

Low bulk density, comparatively high refractoriness, low thermal conductivity, and chemical inertness make vermiculite satisfactory for many types of thermal and acoustic insulation.

REFERENCES

1. Gruner, J. W., The Structure of Vermiculites and their collapse and dehydration: *Am. Mineral*, Vol. 19 No. 12 1934, pp. 557-575.
2. Myers, J. B., Chapter on Vermiculite in *Industrial Minerals and Rocks*: *Am. Inst. Min. and Met. Eng.*, 1949, p. 1102.

Notes on Yugoslavia's Iron and Steel Industry

Yugoslavia must import special steel assortments for the production of which the requisite conditions do not exist in the country. On the other hand, the production of such articles as seamless tubes and the like will allow for considerable exports of iron-steel products, so that the import requirements of rolled steel units will be counterbalanced. These facts are pointed out in *Commercial Information*, Vol. 6, published by the Federal Chamber of Commerce, Yugoslavia. When iron and steel plants now under construction are completed the country will produce annually about 2,500,000 tons of iron ore, 540,000 tons of pig iron, 900,000 tons of raw steel, and 600,000 tons of rolled steel products.

At present four areas are known to contain commercial tonnages of iron ore. The Bosnian mines can supply foundries in Slovenia and Croatia, and contain easily accessible ore of approximately 52 per cent Fe and Mn in the limonite ore type and about 48 per cent Fe and Mn in the siderite. According to present estimates reserves will allow for many years of uninterrupted operations. The largest iron ore mine so far known in Yugoslavia is Vares, which produces ore to an average content of 33 per cent to 35 per cent Fe and Mn. Because of the predominance of siderite the Zenica foundry is planning equipment which will permit the mixing of Vares ores to obtain chemically uniform charges.

Other deposits are known in Bosnia and Hercegovina, while Macedonian deposits of 35 per cent to 42 per cent Fe content will eventually add considerably to national production despite a large phosphorus content which demands experimentation to discern the most suitable treatment processes. Serbia contains numerous but insufficiently explored deposits, many of which are of low manganese content, while others contain large percentages of nickel and chromium.

In addition to these deposits, which are both currently and potentially productive, Yugoslavia possesses considerable reserves of pyrites which, when processed with sulphuric acid, yield pyrites slag containing about 60 per cent Fe. Yugoslavia also has considerable deposits of bauxite which when treated in alumina production yields a red mud containing more than 25 per cent Fe. Finally the lead-zinc flotation by-products of the Trepcja mines, mentioned in our issue of December 4, 1953, contain considerable quantities of iron in the form of pyrites and pyritene.

It is assumed that in the near future Yugoslavia will be called upon to resort to an expansion of steel product output. This expansion will include plate and sheet. In similar case, high quality alloy and rustproof sheets will have to be manufactured.

MACHINERY AND EQUIPMENT

Mechanical Quarrying in North-East

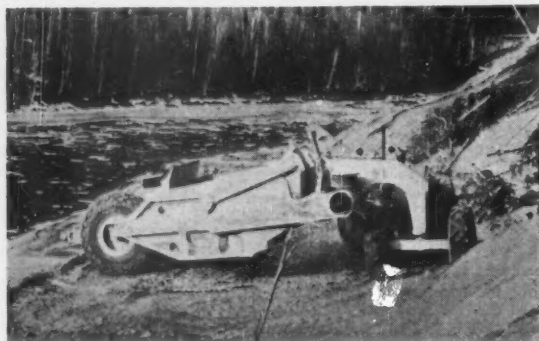
Interesting details of the further exploitation of the deposits of iron ore in the Midlands are contained in an illustrated brochure just issued by Dorman Long and Co. Ltd., the great North-East Coast steel combine which in the past year, produced exactly one tenth of the 17,500,000 tons of steel made in the U.K.

The seam which the company is working at Burley, in Rutland, is about 10 ft. thick with an overburden varying from 12 to 20 ft. To deal with this overburden a modern walking dragline has been installed and this machine also restores the land to agricultural standards so methodically that crops are growing directly in front of and behind the advancing quarry face.

About 4,000 tons of ironstone are removed from the face each week by mechanical excavation, and after calcining, 3,000 tons of oolitic ironstone are available for the use of the company's blast-furnaces on Tees-side. Heaps of raw stone are now laid down in tonnages ranging from 12,000 to 22,000 tons. These are mixed with coal and when fired, three months are allowed before the calcining operation is complete. Since the Burley quarry was originally opened more than 4,500,000 tons of ironstone has been delivered to the Dorman Long blast-furnaces.

Scraper Units in Canadian Railway Construction

The construction of a railway line through the hinterland of Canada embraces problems of typography and climate which can scarcely be exceeded by any of the world's under-developed areas. It is reassuring to know that these problems are being systematically overcome on the construction of the 365 mile



A "Cat" D.8 tractor with Birtley 80 scraper operating in Canada

standard gauge, single track line from Seven Island, Quebec, to Knob Lake, Labrador. This line is being built for the Iron Ore Co. of Canada, and was mentioned by our Canadian correspondent in his letter published on April 25, 1952. The line reaches to the iron fields of Labrador and Northern Quebec and when completed will be one of the most up-to-date on the American continent. Diesel engines will haul the ore cars, each carrying 90 tons.

At the moment "Cat" D.8 tractors, operating with Birtley scraper units, are to the fore in clearing the land over which the rail line must pass. Terrain along the River Moisse and the Menihok Lakes is as rugged as any in the world, and the "Cat" units are faced by vertical cliffs and marshes up to 7 ft. in depth. Temperatures drop to 35 deg. below zero.

The railway is complete to Mile 190 and from Mile 360 back to Mile 220. As much as 10,000 ft. of steel is being laid daily. The line will be completed this year and anticipated iron ore production from the fields is 10,000,000 tons per annum.

The Liege International Fair

The 6th Liege International Fair will be held from April 24 to May 9, 1954, and this year will have special emphasis on coal mining. Attendance from Schuman Plan countries is

expected to be large owing to the order passed by the High Authority for the modernization of all collieries in the Schuman Plan countries. A series of technical discussions are to be held concurrently with the Fair, one of which will be concerned with the complete gasification of mine coal. This international conference follows previous discussion facilities, and is being called by the Institut National de l'Industrie Charbonniere. Mattis Industries Ltd. are the sole United Kingdom agents for the fair.

The five exhibitions comprising the Fair include first, material for the output of coal, subdivided into three sections, dealing in turn with underground mining material, surface mining material and mechanical coal dressing material; and second, material for the utilizations of coal, comprising coking plants and equipments of the gas industry, thermal plants for the output of electrical power, industrial heating, the complete gasification of mined coal and the production of coal chemical derivatives. These two ranges complete Exhibition A.

Exhibition B, that of material for the thermic treatment of metals, includes sections devoted to materials for thermic treatment and special steels and metals, while Exhibition C, devoted to lubrication equipment and products, includes selections of lubrication equipment and products, materials to be lubricated, and equipment for lubrication products.

Inland navigation and waterways equipment comprise Exhibition D, shown as floating equipments, material for the construction and equipment of river boats, and material for the equipment of waterways. Finally, Exhibition E is devoted to equipment for the treatment of feed, industrial and residual waters, and to equipment for the utilization of water.

Space reserved for exhibits comprises some 40,000 sq. m. in three halls and an open air esplanade.

Developments in U.K. Coal Industry

It was recently reported by the N.C.B. that several developments in equipment have been attributed to men employed in collieries in the United Kingdom. Two other developments now follow the units described in our issue of December 18, 1953.

An automatic skip door release for skips with guillotine type doors and a skip positioning guide have been installed at Giants Hall Colliery, near Wigan. When the skip is at the surface and in the correct position for unloading into the hopper a retractable carriage, which is lifted by a pneumatic cylinder, connects with the guillotine door of the skip and lifts it to its fullest extent. The operation is controlled by the banksman. The reversed process closes the door.

The operation of closing the door is connected directly with the air main, but the opening is protected by an interlocking device so that the banksman's control lever cannot be operated until the skip is in the unloading position. Positioning of the skip in the correct unloading position is ensured by the positioning guide. This, too, is operated by the pneumatic cylinder. When the door release is operated, a pair of arms are brought out to grip the skip and hold it square to receive the anti-spillage chute from the hoppers.

A self-acting door for loader-end chutes simplifies the operation of loading points and practically eliminates spillage. A pair of side plates, 3 ft. long by 1 ft. 6 in. at the widest part, are hinged to the outside of the conveyor chute so that the ends project about 1 ft. 6 in. past the lip of the chute. Between the plates is fixed a guillotine door which, when the plates are raised, covers the lower part of the chute mouth. The side plates are so shaped that their lower edges are below the chute lips. The edge of a tub running beneath the loader engages the plates and lifts the guillotine door to cut off the flow of coal. As the front edge of the tub passes on, the plates drop and the coal flows in. When the tub is full it runs forward and its rear edge lifts the plates again to stop the coal. The bottom edges of the plates are long enough to bridge the gap between tubs and avoid spillage. At Dinnington, where 15 cwt. tubs are used, the device has been fitted at seven loading points, all of which average 700 tubs each per shift.

METALS, MINERALS AND ALLOYS

A United Nations Committee of economic experts has turned in a report recommending the setting up of an inter-governmental commission which, among other things, would endeavour to stabilise primary commodity markets. The Committee expresses a preference for buffer stocks as opposed to multi-lateral commodity agreements. Aside from stockpiling in perpetuity, no amount of international control can, as we see it, obscure the basic fact that price and output cannot be stabilized simultaneously, and it is a moot point whether the disruption to production programmes through quota variations in output is more or less harmful to the mining industry than fluctuations in price at a relatively stable rate of consumption.

COPPER.—In a year-end statement on the outlook for copper the President of Revere Copper and Brass Inc. (Mr. J. M. Kennedy), one of the big fabricating companies, took a not unoptimistic view of the industry's prospects for 1954, although he made it clear that he anticipated a year of much keener competition. He estimates that copper production for the year just ended will overall record a small reduction in mine output compared with 1952, due principally to a falling off in Chilean output from 446,144 s.tons, in 1952 to an estimated 390,000 s.tons in 1953. By 1956, he foresees substantial increases in production from all the main producing countries. His estimates are as follows expressed as a percentage increase on 1953 outputs. United States, 24 per cent; Chile, 28 per cent (or 12 per cent on 1952); Rhodesia, 32 per cent; Canada, 30 per cent; Congo, 2 per cent; Australia, 14 per cent.

Although detailed information is not available as we go to press it now appears that the threat of a reimposition on New Year's Eve of the strike at the Potrerillos and Chuquicamata mines in Chile was averted. December 31 represented the expiry of the 30 days' breathing space to which the Chilean Copper Workers' Union had agreed when calling off their strike at the beginning of the month to enable the mining companies and the Unions to reach an agreement.

As pointed out in this column last week, the mining companies have been maintaining that they are unable to agree to any Union demands until their negotiations with the Chilean Ministers of Finance and Mines, leading up to the introduction of revised fiscal legislation in the Chilean Congress, have been completed. As, however, unconfirmed reports from New York and Santiago suggest that the Union's have been granted concessions variously estimated at between 350,000,000 and 600,000,000 pesos annually, it would appear either that the companies have been forced to shift their ground or that these concessions have, in some way, been underwritten by the Chilean Government pending the completion of negotiations.

LEAD AND ZINC.—U.S. prices for both lead and zinc have remained unchanged since the turn of the year. The demand for lead has remained fairly good with emphasis on early shipments, while the demand for zinc has remained slow.

TIN.—From the Tin Study Group's figures published below, the final pattern of 1952 tin production, in the main producing countries, begins to immerge. Overall it seems likely that there will be a slight increase in 1953 over 1952, most of which will have been accounted for by increased Congo production.

Country	November 1953	Jan.-Nov. 1953	Jan.-Nov. 1952
Belgian Congo	1,923	14,582	12,170
Bolivia*	2,590	29,449	29,032
Indonesia	2,770	30,607	31,827
Malaya	4,765	51,053	51,895
Nigeria	665	7,539	7,576

* Figures represent exports and not production; both monthly output and cumulative totals are for October only.

At first sight the somewhat surprising fact that world output has not already reacted to last year's sharp fall in price, is, of course, partly accounted for by the fact that many producers, in anticipation that a tin restriction scheme might be worked out, have done everything possible to keep their production up in the interval, even at some loss, so as to be able to claim a maximum share of the quota eventually allotted to their country.

This, however, is not a state of affairs which can be expected to last very much longer. Soon it will either become apparent that no tin agreement is likely to be reached, in which case uneconomic production will cease, or else a restriction scheme will be introduced in which case it seems virtually certain that quotas will come into operation at a very early stage and production will be compulsorily curtailed. Either way, in the absence of a sharp increase in price, which might follow some unfavourable political development such as the collapse of French resistance in Indo-China, it seems inevitable that 1954 must witness a marked falling off in world tin production.

ALUMINIUM.—In a year-end statement from Montreal, Mr. N. V. Davis, President of Aluminium Ltd., has forecast another good year for this metal despite a notable increase in primary aluminium production in North America, which by the end of 1953 had, he estimated, brought supply and demand approximately into balance. "The increasing use of aluminium in civilian applications, coupled with defence requirements, should support a continuing strong demand in 1954," he said.

Certainly, both civilian and military pressure on aluminium shows little sign of letting up as is emphasised by the current Washington discussions on the implementation of the so-called "third round" expansion programme referred to in this column last week. The emphasis is being placed not on whether the additional metal will be needed, but rather on where it is to come from. In opposition to the Washington views reported here last week, the Joint Committee on Defence Production has now issued a report strongly in favour of carrying on with the "third round" expansion as originally envisaged.

Finalizing of the next bout of capacity expansion in the States has, of course, been complicated in recent months by the action of the Department of Justice in seeking, under the Anti-Trust Laws, to prevent the implementation of the agreement whereby Alcan was to supply 600,000 tons of aluminium to Alcoa by the end of 1957. It seems hard to believe that this legal obstacle will be permitted to wreck Washington's supply programme, but if it were to happen it is difficult to see any of the other big U.S. producers taking up this tonnage without substantial Government guarantees, as their fabricating capacity is already fully taken up with their own primary output.

In his statement, Mr. Davis also says that ingot production by Alcan increased by 8 per cent last year to a figure of about 539,000 s.tons. The largest share of this output went to independent fabricators in the States for whom Alcan is the major source of supply, and total deliveries to the States were more than double those of 1952 at over 260,000 s.tons.

Aluminium Union (Aluminium Ltd.'s international trading company) has announced an increase of £1 per ton to £156 for virgin aluminium (99.5 per cent) delivered consumers' works in the U.K. This small increase is attributed to the appreciation of the Canadian dollar in terms of sterling.

MAGNESIUM.—Following on the resumption of private trading at the beginning of this year, it is reported that the Canadian company, Dominion Magnesium, proposes to market magnesium ingot in the U.K. at 34 c. per lb. c.i.f. U.K., equivalent to slightly less than 2s. 6d. per lb. This is within about 1d. per lb. of other quotations of which we have heard.

TUNGSTEN.—The Ministry of Materials has announced a further reduction in its selling price for 65 per cent tungsten ores this week. The reductions, both for wolframite and for scheelite, amount to 20s., the prices now quoted being 165s. per 1 ton unit d/d. for wolframite and 150s. for scheelite. New York prices are also trending downwards. The London market remains virtually at a standstill, although persistent demand continues for high-grade scheelite from America and to a lesser extent from Europe with prices being quoted at between 200s. and 240s. per unit.

Our Portuguese correspondent reports that October exports of wolframite at 420 tonnes were substantially above average which, no doubt, reflected an anxiety on the part of the trade to clear off outstanding contracts before the price fell any further. Portuguese trade circles believed that there may shortly be a resumption of exports of Chinese wolfram to the free markets.

Iron and Steel

The active resumption of business in iron and steel after the holidays has been delayed by the threat of guerilla strikes by the electricians, engineers, and shipbuilders. A most critical point in industrial relationship has been reached, and pending a clarification of the vital issues involved, consumers of iron and steel are inclined to defer further commitments.

Granted industrial peace, the steel makers take a hopeful view of the outlook. They have, in fact, raised the production target for 1954 above the record figures of 1953. Home requirements are still on an impressive scale and in spite of all the discriminatory restrictions on the export trade, there has been a small increase in the volume of shipments to overseas destinations.

During the final quarter of last year many steel users were inclined to run down their stocks, and a point has been reached when it is believed that replenishments are overdue. In any event, the healthy state of the heavy industries ensures a substantial demand for capital goods, with iron and steel prominent on the list. The improvement in the foundry trade has led to a bigger demand for pig iron and any small surplus accumulated during the holiday period promises to be speedily absorbed.

Pressure for all grades of iron and steel scrap is also intense, and as the national scrap drive was abandoned on December 31, merchants now take over the sole responsibility of organizing supplies for the steel works and foundries, maximum prices being still under the control of the Iron and Steel Board.

Substantial imports of steel plates of foreign manufacture are still necessary to meet the deficiency in the supplies from home sources. It is now admitted that there has been a miscalculation in the estimated requirements of the shipbuilding and boilermaking industries and although a new plate mill is now in course of construction in the North of England and another is projected, this further capacity may not be available until 1955.

The sheet makers also begin the year in a very strong position. The volume of orders already booked for home delivery and for shipment overseas is very considerable and a constant stream of enquiries suggests that the mills will be busily engaged throughout the first half of the year.

Only the re-rolling mills are really slack and there appears to be no prospect of any improvement until new export orders are available.

The London Metal Market

(From Our Metal Exchange Correspondent)

The Exchange has been relatively inactive during the past week and there have been no appreciable changes in price levels, although in copper there has been a slight contraction in the backwardation. Consumer demand in the U.K. for all four metals has been good, and on the Continent considerable interest is also being shown for metals with near delivery which shows uncertainty as to the future.

At this time of the year it is interesting to look back on the price movements during the previous twelve months, and this is particularly so in the case of lead and zinc, as at the beginning of January, 1953, the lead market had been in operation for three months and the zinc market was just starting. Prices for future delivery of both metals fell steadily until the third week in April, and the price differential varied between £6 and £12 per ton. After that period prices rose until the end of July, with the lead price leading the way and the differential increasing to as much as £20. Since that date both prices have moved more or less in sympathy but without developing any definite trend, and for purposes of comparison the price of lead for the three months' position on August 6 was £87½ and the price of zinc £73. A marked feature has been the fluctuation in the backwardations, which in the case of lead has been dependent upon the off-take of metal for shipment overseas, and in the case of zinc on the availability of imported material to the market. At the time of writing, demand for lead for export does not play any part in the market and, therefore, the backwardation is down to some 30s. per ton, whereas in the case of zinc the possibility of imports appears less than in recent months and, therefore, the backwardation is again showing a tendency to increase.

Tin, which started the year around the £950 per ton mark, has only suffered relatively minor fluctuations after the precipitous fall during the second quarter of the year.

It is even more difficult than usual to prophesy as to possible price trends during 1954, but given reasonable distribution of copper and lead the price levels should fall, whereas the zinc price should not fluctuate very much. The tin situation is dominated by the proposed buffer pool arrangement, and if this is inaugurated the lower and higher price limits are public knowledge, whereas if the necessary number of ratifications are not forthcoming to set up the scheme, then it is to be expected that the price level will fall sufficiently to cut production in accordance with traditional economics.

On Thursday morning the Eastern price for tin was equivalent to £654½ per ton c.i.f. Europe.

Closing prices and turnovers are given in the following table. In connection with turnover figures it should be remembered that the market was closed on New Year's day.

	December 31		January 7	
	Buyers	Sellers	Buyers	Sellers
Tin				
Cash	£655	£657½	£660	£662½
Three months	£630	£632½	£635	£639
Settlement	£655		£662½	
Week's turnover	570 tons		240 tons	
Lead				
Current month	£89½	£89½	£89½	£90
Three months	£88	£88½	£88½	£88½
Settlement				
Week's turnover	5,800 tons		1,950 tons	
Zinc				
Current month	£74½	£75	£74½	£74½
Three months	£73½	£73½	£73	£73½
Settlement				
Week's turnover	2,325 tons		2,675 tons	
Copper				
Cash	£235	£235½	£231	£232
Three months	£221½	£222	£221	£221½
Settlement	£235½		£232	
Week's turnover	6,150 tons		2,075 tons	

OTHER LONDON PRICES—JANUARY 7

ANTIMONY

English (99%) delivered,	
10 cwt. and over	£210 per ton
Crude (70%)	£200 per ton
Ore (60% basis)	22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£483 per ton
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OTHER METALS

Aluminium, 99.5% £156 per ton	Osmiridium, £40 oz. nom.
Bismuth	Osmium, £65/£70 oz. nom.
(min. 4 cwt. lots) 16s. lb.	Palladium, £7 15s./£8 10s. oz.
Cadmium (Empire), 13s. 10d./	Platinum, £27/£33 5s.
14s. 4d. lb.	Rhodium, £42 10s. oz.
Chromium, 6s. 5d./7s. 6d. lb.	Ruthenium, £25 oz.
Cobalt, 20s. lb.	Quicksilver, £61 15s.
Gold, 248s. f.o.z.	ex-warehouse
Iridium, £60 oz. nom.	Selenium, 30s. 6d. nom.
Magnesium, 2s. 10½d. lb.	per lb.
Manganese Metal (96%-98%)	Silver 73½d. f.o.z. spot and f'd.
£225/£262	Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	30% 5s. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (lumpy)	£14 5s. 6d. per ton c.i.f.
" " (concentrates)	£14 5s. 6d. per ton c.i.f.
" " Refractory	£13 17s. 6d. per ton c.i.f.
Baluchistan Metallurgical	£15 19s. 6d. per ton c.i.f.
Magnesite, ground calcined	£26 - £27 d/d
Magnesite, Raw	£10 - £11 d/d
Molybdenite (85% basis) ..	102s. 4d.-103s. per unit c.i.f.
Wolfram (65%)	World buying 150s. nom.
"	165s. nom. U.K. Selling
Scheelite (65%)	World buying 135s.
"	150s. nom. U.K. Selling
Tungsten Metal Powder ..	16s. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten	13s. nom. per lb. (home)
Carbide, 4-cwt. lots ..	£35 13s. 9d. d/d per ton
Ferro-manganese, home ..	£52 10s. 0d. per ton
Manganese Ore Indian c.i.f. Europe	
(46% - 48%)	7s. 11d. - 8s. 4d. per ton
Brass Wire	2s. 5½d. per lb. basis
Brass Tubes, solid drawn ..	1s. 10d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

Stock markets again showed up well. Gilt-edged were steady.

Mining shares generally were brighter. Kaffirs were the main feature. After some profit-taking many shares continued to go ahead. Among finance houses, the Anglo American group were well supported as also were Strathmore and West Witwatersrand. Johnnies, however, did not wholly recover from the setback. The new shares closed around 10s. 6d., having at one time fallen as low as 7s. 10½d.

Uranium producers recovered from the profit-taking and mostly recorded good gains but many older mines not scheduled as uranium producers slipped back. There was considerable interest in the December returns but disappointment with results from many properties. There were, however, noteworthy exceptions, mostly among the younger mines. The December figures were, of course, affected by the Christmas holiday period. Doornfontein and West Driefontein returned good results, the former particularly exceeded market expectations. Stilfontein were also in demand and rose sharply.

In the Orange Free State, Western Holdings produced more gold from a similar tonnage to the November returns and a higher profit. St. Helena, while not a uranium producer, showed steady progress. Welkom figures were disappointing. Freddie's North managed to reduce their monthly loss unlike Freddie's South. Geoffries and Ofsits both jumped; the high prices can probably be attributed to hopes of new flotations in the O.F.S. during the current year. The American Kennecott Copper Company has advanced another £5,000,000 to Merriespruit and has now a total investment of £7,500,000 in this one mine; by any standard a large sum. The shares rose 6d. Kennecott also have a big interest in Virginia amounting to some £6,500,000. The investment of a sum of this magnitude by shrewd business people should argue a promising future for these two properties.

West Africans enjoyed some recovery although conditions were quiet. Developments at Ashanti were satisfactory, not startling. Working profits were again lower against the com-

parable period last year. Offin River have recently risen to around the 2s. mark from a low level of 1s. 4½d. This has apparently been caused by small but persistent buying in a market short of stock.

Australian gold shares were mostly the turn higher. Recent figures show that cost and profit levels are holding their own fairly well. In the miscellaneous market, Motapas jumped from their recent eclipse price. There have been unconfirmed rumours that the company may become a uranium producer. Goldfields Rhodesian Development also rose in sympathy.

There was a revival of interest in coppers. There have been reports of new mineral finds in Northern Rhodesia by the Rhodesian Selection Trust group. Exploration companies were financed as to 45 per cent each by Mufulira and Roan Antelopes and 10 per cent by Chartered. It is reported that the north-western province on the Congo border may prove to have rich mineral areas. Shares of interested companies were in demand. Rhodesian Katangas also jumped. There has been substantial buying from knowledgeable quarters and unconfirmed rumours of rich drilling results on the property. Another coal shortage is reported from Northern Rhodesia. Railings from Wankie have been falling away. Shipments by long sea and the Benguela railway are being made from South African collieries. Tanks fell despite this news.

Eastern tin shares declined. The outlook for the coming year is not very bright, and if ratification of the recent agreement is withheld it is thought that many marginal mines will close down. Beralts fell on the further reduction in the price of wolfram.

There was some revival in the lead/zinc market, particularly in Barriers, but Lake George were lower on the discouraging report from the chairman concerning the outlook for the property if there is no increase in the metal price.

Canadian shares were higher on the general improvement in the United States markets following President Eisenhower's speech.

FINANCE	Price Jan. 6	+ or - on week	O.F.S.	Price Jan. 6	+ or - on week	MISCELLANEOUS GOLD (contd.)	Price Jan. 6	+ or - on week	TIN (Nigerian and Miscellaneous) contd.	Price Jan. 6	+ or - on week
African & European...	2-3		+1/2 Freddie's	10/-	-3d	St. John d'El Rey	20/3	-9d	Geevor Tin	9/9	-3d
Anglo American Corp.	5 1/2		+1/2 Freddie's N.	9 7/8	-1 1/2d	Zams	31/6		Gold & Base Metal	3/-	+1 1/2d
Anglo-French	20/-		+2/9 Freddie's S.	8 7/8	-6d	DIAMONDS & PLATINUM			Jantar Nigeria	7 7/8	+6d
Anglo Transvaal Consol.	23/9		+3/9 F. S. Geduld	2 1/2	-8	Anglo American Inv.	4 1/2		Jos Tin Area	12/-	-6d
Central Mining (£1 shrs.)	29/9		+1/6 Geoffries	15/9	+1 1/2d	Cast	20/6	+3d	Kaduna Prospectors	2 1/2	+1 1/2d
Consolidated Goldfields	50/3		-6d Harmony	27/-	-4 1/2d	Cons. Diam. of S.W.A.	4 1/2		Kaduna Syndicate	2 1/2	+1 1/2d
Consol. Mines Selection	30/-		+1/10d Lorraine	10/-	+2	De Beers Defd. Bearer	68/3	+3d	London Tin	5 1/2	
East Rand Consols	4/3		+1/10d Lydenburg Estates	15/6	+1/3	De Beers Pfd. Bearer	15 1/2		United Tin	3 1/2	
General Mining	3 1/2		+1/6 Merriespruit	9/6	+6d	Pots Platinum	8/6		SILVER, LEAD, ZINC		
H.E. Prop.	41/-		-3d Middle Wits	16/10 1/4	+1/3	Waterवाल	13/6		Broken Hill South	41/10 1/4	+7 1/2d
Henderson's Transvaal	8/-		+3d Ofsits	45 7/8	+4 1/2d	COPPER			Burma Mines	19	+1/9
Johnnies	48/9		-9d President Brand	35/9	+1 1/2d	Chartered	53/9	+1/9	Consol. Zinc	28/9	+1/9
Rand Mines	34		+1/10d President Steyn	24/6	+4 1/2d	Esperanza	7/3		Lake George	5/3	-3d
Rand Selection	33/9		+1/10d St. Helena	16/6	+1/9	Indian Copper	4/-		Mount Isa	32/6	+1/-
Strathmore Consol.	36/3		+1/10d Virginia Ord.	14/-	+8	Messina	3 1/2		New Broken Hill	23/3	+9d
Union Corp. (2/6 units)	29/-		+9d Welkom	19/3		Nchanga	6 1/2		North Broken Hill	2 1/2	+1/2
Vereeniging Estates	3 1/2		+1/3 Western Holdings	3 1/2		Rhod. Anglo-American	47/3	+9d	Rhodesian Broken Hill	8 1/2	+1 1/2d
Wits	34 1/2					Rhod. Katanga	18 1/2	+2 7/8	San Francisco Mines	17/6	
West Wits	43/-					Rhodesian Selection	14/3	+1 1/2	Uruwira	3 1/2	+10 1/2d
RAND GOLD			WEST AFRICAN GOLD			Rhokana	17 1/2		MISCELLANEOUS		
Blyvoors	36/6		Amalgamated Banket.	1 7/8		Rio Tinto	19 1/2		BASE METALS & COAL		
Brakpan	9/9		Ariston	5/9	+1 1/2d	Roan Antelope	14/3		Amal. Collieries of S.A.	41/9 1/2	-1/6
City Deep	18/9		Ashanti	20/6	+1 1/2d	Selection Trust	36/-	+2/3	Associated Manganese	45/6 1/2	+6d
Consol. Main Reef	17/6		Bibiani	5/-	+1 1/2d	Tanks	57/9	-1/-	Cape Asbestos	23/9 1/2	+9d
Crown	37/6		-1/3 Bremang	2/3	+1 1/2d	Tharsis Sulphur Br.	43/9	+7 1/2d	C.P. Manganese	25/6	+1/3
Daggas	3 1/2		-1/3 G.C. Main Reef	3/6	+1 1/2d	TIN (Eastern)			Consol. Murchison	54/6	-6d
Doornfontein	28/6		+1/6 G.C. Selection Trust	6 1/2	+4 1/2d	Ayer Hitam	24/9	-7 1/2d	Mashaba	3d	
Durban Deep	33/9		-1/6 Konongo	2/6	+1 1/2d	Bangrin	8/-		Natal Navigation	3 1/2	+1 1/2d
E. Daggas	15/-		-7 1/2d Lyndhurst Deep	1/-	+1 1/2d	Gopeng	7/9	-3d	Rhod. Monteleo	1/6	+3d
E. Geduld	27/9		+9d Marlu	1/6	+1 1/2d	Hongkong	6/6		Turner & Newall	69/3 1/2	-1/3
E. Rand Props	2 1/2		-9d Taquah & Abosso	2/6	+3d	Kamunting	15/-		Wankie	13/6	-9d
Geduld	3 1/2		AUSTRALIAN GOLD			Kepong Dredging	9/1 1/2		Witbank Colliery	3 1/2	
Govt. Areas	11/6		Boulder Perseverance	2/9	+1 1/2d	Kinta Tin Mines	9/9		CANADIAN MINES		
Grootvlei	21/-		Gold Mines of Kalgoorlie	14/6	+3d	Malayan Dredging	26/6	-3d	Dome	\$28 1/2	+1 1/2d
Libanon	9/6		Great Boulder Prop.	8/9	+6d	Pahang	11/10 1/2		Hollinger	\$23	+1 1/2d
Luipaards Vlei	20/9		Lake View and Star	14/-	+3d	Pengkalen	8/-		Hudson Bay Mining	\$72	
Marievale	13/9		Mount Morgan	17/6	+6d	Petalung	12/-	-1 1/2d	International Nickel	\$64 1/2	+1
Modderfontein East	15 7/8		North Kalgorli	6/6	+1 1/2d	Siamese Tin	7/6 1/2		Mining Corp. of Canada	\$4	+1 1/2d
New Kleinfontein	22/3		Sons of Gwalia	5/6	+1 1/2d	Southern Kinta	13/3		Noranda	\$110	-1
Randfontein	68/3		South Kalgorli	6/6	+1 1/2d	S. Malayan	24/-	-6d	Quemont	\$5 1/2	
Robinson Deep	10/6		Western Mining	13/9	+1 1/2d	S. Tronoh	7/6	+1 1/2d	Yukon	3/9	+1 1/2d
Rose Deep	13/9		MISCELLANEOUS GOLD			Sungei Kinta	10/-		OIL		
Simmer & Jack	20/-		-2/6 Cam and Motor	9/4 1/2		Tekka Taiping	5/6		Anglo-Iranian	8 1/2	
Springs	5/9		+7 1/2d Champion Reef	4/9	+6d	Tronoh	23/3	-1/-	Apex	45/3 1/2	-1/-
Stilfontein	30/6		+2 1/4d Falcon Mines	7/-		TIN (Nigerian and Miscellaneous)			Attock	35/-	+9d
Sub Nigel	40/-		-2/6 Globe & Phoenix	22/-		Amalgamated Tin	11/-	-1 1/2d	Burmah	58/9	-9d
Van Dyk	6/6		+1/6 G.F. Rhodesian	6/6	+7 1/2d	British Tin Inv.	17/9		Canadian Eagle	28/-	+9d
Venterspost	14/-		-1/6 London & Rhodesian	4/9	+3d	Ex-Lands Nigeria	4/4 1/2		Mexican Eagle	22/6	-1/3
Vlakfontein	6 1/2		+2/- Motapa	3 1/2	+4 1/2d				Shell (bearer)	97/6	
Vogelstruisbult	35/9		-2/- Mysore	4/6	+4 1/2d				Trinidad Leasehold	18/6 1/2	+1/3
West Driefontein	6 1/2		+1/6 Nundydroog	6/-	+1 1/2d				T.P.D.	22/3	-3d
W. Rand Consolidated	24/-		+1/6 Ooregum	3 1/2	+1 1/2d				Ultramar	28/6	-10 1/2d
Western Reefs	2 1/2		-1/6 Oroville	16/9							

COMPANY NEWS AND VIEWS

Rand and O.F.S. Returns for December

The Christmas holidays, and consequently the short working month, was no doubt responsible for the rather disappointing production and profit figures contained in the Rand and O.F.S. mine returns for December.

Several of the newer producers, however, announced impressive results. On the far Western Rand, the West Wits line producer, Doornfontein, surprised the market by announcing a profit of £42,289 against £6,563 in November the first month it was officially in production. West Driefontein, also situated in the West Wits line, milled approximately the same tonnage as Doornfontein and in spite of a rise in crushing costs of 6d. per ton to 66s. per ton, working profits improved by approximately £20,000 to £280,600.

In the Orange Free State, Western Holdings, with an unchanged milled throughput and an increase of 1s. 11d. to 56s. per ton milled, expanded its working profit from £29,000 to £40,200, indicating thereby the better grade of ore currently being sent to the mill. Welkom announced another disappointing return, the mill throughput and gold production both being lower than in November. On the other hand, St. Helena continued to make steady progress and last month's profit figure once more represented an advance over any previous monthly return.

Company	December, 1953			Tons	Yield (oz.)	Profit (£000)	Tons	Yield (oz.)	Profit (£000)	Tons	Yield (oz.)	Profit (£000)
	(000)	(000)	(000)									
Gold Fields												
Doornfontein...	44	13,201	42.3	J	84	23,428	48.9	—	—	—	—	—
Libanon...	88	18,152	46.5	J	513	104,530	264.4	497	99,377	253.1	—	—
Luipaards Vlei...	104	19,309	36.3	J	631	116,925	244.1	607	114,780	297.1	—	—
Rietfontein...	321	71,878	299.4	D	321	71,878	299.4	323	72,087	327.9	—	—
Robinson...	100	20,500	14.4	D	1165	229,069	158.4	1331	223,246	145.5	—	—
Simmer & Jack...	128	20,474	11.9	D	1477	138,340	152.9	1486	237,450	190.6	—	—
Sub Nigel...	66	22,012	97.3	J	399	132,519	610.9	396	136,803	703.6	—	—
Venterspost...	107	25,199	57.3	J	629	147,601	338.2	616	142,784	364.8	—	—
Viakfontein...	38	13,654	72.1	D	444	160,975	864.6	445	165,123	940.3	—	—
Vogels...	102	25,577	106.0	D	1180	297,991	1208.1	990	257,682	1016.6	—	—
West Dri...	45	34,569	280.6	J	267	192,723	1547.0	160	101,722	752.9	—	—
Anglo American*												
Brakpan...	114	20,300	22.9	D	1377	246,290	271.2	1419	255,037	421.2	—	—
Daggas...	210	49,319	299.6	D	2608	613,874	3900.7	2787	663,047	4646.0	—	—
East Daggas...	95	16,161	48.9	D	1104	190,906	583.8	1140	202,694	731.9	—	—
S.A. Land & Ex.	101	18,537	52.8	D	1204	219,849	619.7	1316	237,007	818.7	—	—
Springs...	134	18,595	9.1	D	1735	238,895	120.8	1954	258,741	224.8	—	—
Welkom...	65	12,979	4.6	D	759	148,540	122.9	606	106,118	115.0	—	—
Western Hldgs.	46	13,767	40.2	D	243	65,883	121.2	—	—	—	—	—
W. Reef Ex.	110	22,010	67.9	D	1311	267,126	934.6	1344	280,302	1214.2	—	—
Central Mining												
Blyvoor...	95	55,884	442.6	J	596	352,265	2886.8	633	382,332	3302.4	—	—
City Deep...	163	31,272	18.1	D	1922	371,017	254.4	1851	375,759	311.8	—	—
Cons. M.R.	158	22,995	19.3	J	1011	140,582	117.0	1099	152,015	166.4	—	—
Crown...	271	42,983	51.9	D	3272	518,576	519.2	3253	518,164	475.8	—	—
D. Roodepoort...	178	28,981	56.7	D	2143	357,814	749.1	2168	374,333	1007.8	—	—
East Rand Prop.	186	42,683	117.6	D	2273	506,631	1358.2	2451	528,652	1695.4	—	—
Modder B.	53	5,576	2.6	D	651	69,679	23.4	675	74,517	72.1	—	—
Modder East...	106	12,541	10.0	J	685	78,357	84.0	701	80,951	135.2	—	—
Rose Deep...	66	10,265	10.0	D	865	229,333	105.2	983	137,705	113.4	—	—
Welgedacht...	33	4,095	1.9	J	203	25,333	17.1	203	24,921	26.8	—	—
J.C.I.*												
E. Champ d'Or...	20	2,605	L 9.0	D	285	43,385	L 18.7	355	55,026	98.9	—	—
Freddies N.†	26	5,002	L 23.8	D	150	26,292	L 136.1	—	—	—	—	—
Freddies S.†	31	4,600	L 22.2	D	172	28,466	L 114.9	—	—	—	—	—
Govt. G.M.A.	249	32,444	30.1	D	2952	396,243	580.7	2943	387,698	625.3	—	—
New State...	13	2,889	1.3	D	307	50,509	12.4	543	75,125	12.2	—	—
Randfontein...	294	39,392	25.5	D	3661	468,216	317.6	4127	494,887	356.2	—	—
Union Corp.												
East Geduld...	128	39,363	285.9	D	1610	485,266	3597.7	1725	517,545	4073.3	—	—
Geduld Prop.	90	14,531	23.0	D	1125	179,265	360.9	1253	181,923	410.1	—	—
Grootvlei...	180	38,251	209.1	D	2203	469,198	2723.3	2316	501,670	3200.5	—	—
Marievale...	62	15,234	65.2	D	749	183,210	795.0	723	181,248	843.3	—	—
St. Helena...	76	16,200	44.6	D	799	162,333	317.2	598	118,493	86.5	—	—
Van Dyk...	79	14,152	2.4	D	1022	169,372	15.3	1246	183,648	139.4	—	—
General Mining*												
S. Roodepoort...	27	6,058	20.1	J	165	36,091	122.4	163	37,109	139.0	—	—
W. Rand Cons.	208	28,239	62.0	D	2651	366,094	999.8	2624	399,839	1489.6	—	—
Anglo												
Transvaal*												
N. Klerksdorp...	11	1,442	0.3	D	129	17,188	7.0	135	15,598	12.2	—	—
Rand Leases...	154	26,830	13.2	J	956	164,297	81.5	1079	180,572	333.4	—	—
Village M.R.	34	5,258	12.1	J	205	31,769	72.1	203	31,736	88.5	—	—
Others												
N. Kleinfontein...	106	13,440	20.0	D	1289	165,701	296.1	1292	168,074	373.0	—	—
Sparwater...	10	2,569	L 2.7	D	125	28,919	L 36.1	126	27,545	L 29.4	—	—
Stilfontein...	72	21,964	111.9	D	780	229,430	1146.5	294	64,670	136.9	—	—
W. Nigel...	17	3,965	8.9	J	103	23,501	48.0	101	—	45.4	—	—

Notes.—Profit figures are in all cases figures of working profit excluding profit from sale of gold at premium prices. In case of groups marked with an asterisk (*) profit includes sundry revenue. Profit figures preceded by L indicates a loss, † Excluding development expenditure.

Coal Results Below Average in November

With the exception of New Clydesdale, one of the collieries in the Clydesdale (Transvaal) Collieries group, which announced a record monthly return, the November production returns of 17 of the leading coal producers in Southern Africa were, at best, average. However, Vierfontein falls outside this comment as its output for November was the best announced since it started production in May last.

NOVEMBER OUTPUTS

Company	November	Months Since Year End	Cumulative Totals	
			This year to date	Last year to date
Amal. Coll. of S.A.	580,384	11	6,862,375	7,206,036
Apex	76,894	11	875,589	907,382
Blesbok	49,290	11	570,918	521,032
New Clydesdale	77,905	11	670,031	347,762
Coronation	81,109	11	977,280	1,003,966
Dundee	36,739	11	399,570	428,351
Natal Navigation	111,634	11	1,243,664	1,324,170
New Largo	46,918	11	518,005	—
S.A. Coal Estates	138,202	11	1,530,633	1,508,431
Springbok	72,291	11	787,855	772,198
Transvaal & Delagoa Bay	119,728	3	371,496	—
Tweefontein	104,067	11	1,171,503	1,197,892
Van Dyks Drift	43,518	11	906,261	503,407
Vierfontein	54,495	11	285,177	—
Vryheid Cor.	41,832	11	468,864	458,760
Vryheid Cor.*	34,103	11	397,243	258,188
Wankie Colliery	193,609	11	2,298,393	2,247,895
Wankie Colliery*	12,496	11	139,115	109,743
Witbank	139,493	11	1,470,063	1,324,302

* Coke

Wankie's coal output was the lowest since last April while Blesbok and Amalgamated Collieries of S.A. announced the lowest output returns this year, with the exception in each case of those announced for February.

On the other hand, the output from Springbok and S.A. Coal Estates showed an improvement over recent months.

Kennecott Invest a Further £5,000,000 in the O.F.S.

Merriespruit (Orange Free State) Gold Mining Company has announced that negotiations have been successfully concluded with Kennecott Copper Corporation of New York, whereby that Corporation has agreed to provide Merriespruit with additional funds of £5,000,000 to bring the mine into production at a milling rate of 75,000 tons a month.

Petaling Tin Acquires 600 Acres in Selangor

Petaling Tin announces the conclusion of arrangements for the purchase from Castlefield (Klang) Rubber Estate of an area of approximately 600 acres of tin-bearing land for the sum of £200,000. Of this total, £180,000 is payable to the rubber company over the next five years and £20,000 to Klang Prospecting Syndicate.

The portion of the area selected contains approximately 50,000,000 cu. yd., averaging 0.34 kati per cu. yd., and should provide work for No. 6 dredge for approximately ten years. A general survey of the future life of the company's property will be given in the chairman's speech at the next annual meeting. Actually, the reserve land acquired is not expected to be mined for at least ten years and, therefore, the rubber company has been allowed to retain tapping rights until December 31, 1962.

Bid of \$2.50 per 4s. Share of Oroville Dredging

Oroville Dredging announces that negotiations are in hand as a result of which they expect to receive an offer for the purchase of not less than 90 per cent, in nominal value, of the company's shares (or such smaller percentage as the purchaser may agree to accept) at the price of U.S. \$2.50 per 4s. share. The offer is dependant upon certain consents being obtained from H.M. Treasury and some few weeks must elapse before a decision is obtained. Provided, however, that such approval is granted, a formal offer will be communicated to shareholders together with a circular explaining the terms and stating the views of the directors. At the same time, the directors' report and accounts for the year ended September 30, 1953, will be sent to shareholders.

Mining Men and Matters

Mr. W. K. Davey, chairman of the London Metal Exchange, was awarded the C.B.E. in the New Year's honours list.

The death has occurred of **Mr. Patrik Danielsson**, chief of the Atlas Diesel Project Department, Stockholm.

Transvaal Chamber Changes Name.—The Transvaal Chamber of Mines has announced that owing to the enlarged field of operations of its member mining companies in the Free State, it is changing its name to Transvaal and Orange Free State Chamber of Mines.

Mr. Stanley Wickett has resigned his position as chairman of Kent (F.M.S.) Tin Dredging and has been succeeded by **Major W. E. Hosking**. Mr. Wickett retains his seat on the Board.

Christmastime.—Once again *The Mining Journal* received a delightful variety of Christmas remembrances from friends and well wishers. In particular we would like to acknowledge the good wishes for Christmas and the New Year received from the following: J. Blackwood Hodge and Company; The Bristol Aeroplane Company Ltd.; British Insulated Callender's Cables Ltd.; Butterley Company Ltd.; Denver Equipment Company Ltd.; Helmets Ltd.; Holman Bros.; Hunting Group of Companies; Rip Bits Ltd.; Rubber Improvement Ltd.; Ruston Bucyrus Ltd.; Richard Sutcliffe Ltd.; J. W. Vickers and Company Ltd.; and Hugh Wood and Company Ltd. We would like to take this opportunity of again wishing all our friends at home and abroad a Happy and Prosperous New Year.

SHIFT-BOSS. Seven years' experience gold mining, desires similar post. Willing to accept position in any country except West Africa. Excellent references and certificates. Reply to Box No. 543, *The Mining Journal*, 15 Wilson Street, Moorgate, London, E.C.2.

QUALIFIED MINE MANAGER required for Metalliferous Mine in Cumberland. Experience in Barytes Mining and ore treatment an advantage. Write, giving details of age, education, qualifications and experience to Box No. 545, *The Mining Journal*, 15 Wilson Street, Moorgate, London, E.C.2.

WELL KNOWN MANUFACTURER requires agents for the sale of detonator cases and power caddies in usual coal mining and quarrying areas, established connection with coal boards essential. Write Box No. 544, *The Mining Journal*, 15 Wilson Street, Moorgate, London, E.C.2.

HIGH GRADE Ta205/Cb205/Sn02 MINES. Estimated monthly production 25 tons complex, 25 tons Sn02. Concessionaire would like to hear from firm interested in supplying machinery and technical supervision for developing. No capital beyond cost machinery required. Reply to Box 542, *The Mining Journal*, 15 Wilson Street, Moorgate, London, E.C.2.

HER MAJESTY'S COLONIAL SERVICE

Vacancies exist for Inspectors of Mines in Northern Rhodesia.

Appointment is on probation to the pensionable establishment with salary according to war service and experience, in the scales £695-£975 (Preliminary) £1,020-£1,515 (main) per annum, plus a non-pensionable cost of living allowance of between £92 and £195 10s. per annum according to salary. A really able officer would be eligible for consideration for promotion to the main scale in due course without progressing in the normal way through the preliminary scale.

Income tax at low local rates. Quarters, if available, at rental of between £72 and £108 per annum according to salary. Free passages provided for officer and family up to a total cost of three adult fares once each way each tour. Leave granted at the rate of five days for each completed month of resident service.

Candidates (30-45 years) must possess a university degree or diploma of a School of Metalliferous Mining, together with a minimum of five years' post-graduate experience, including experience of big-scale underground mining. Duties entail the responsibility for enforcing the provisions of the mining and explosive laws.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith Street, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference No. CDE 132/3/03.

THE CENTRAL MINING—RAND MINES GROUP

DIVIDENDS—DECEMBER, 1953

The following dividends payable to shareholders registered in the books of the Companies at the close of business on December 31, 1953, will be paid on or after February 9, 1954. The dividends on shares to bearer will be paid after surrender of the appropriate coupons at the Office of the London Secretaries of the Companies, 4 London Wall Buildings, E.C.2, or, with the exception of the Company marked with an asterisk, at the Crédit Lyonnais, Paris.

The dividends will be payable in British currency, at par, at the rates declared in South African currency (Column No. 4), less South African non-resident shareholders' tax (Column No. 5).

NAME OF COMPANY (Each incorporated in the Union of South Africa.)	Dividend No.	Coupon No.	Amount of dividend declared per share	Deduction in respect of South African non-resident shareholders' tax, per share	Amount of dividend after such deduction, per share	Provisional allowance of credit authorised in the £	Gross amount of dividend, per share	Rate of South African taxation applicable in the £	Rate of deduction of United Kingdom income tax in the £	Amount of United Kingdom income tax deducted, per share	Net amount of dividend per share
(1)	(2)	(3)	(4) s. d.	(5) s. d.	(6) s. d.	(7) s. d.	(8) s. d.	(9) s. d.	(10) s. d.	(11) s. d.	(12) s. d.
Blyvooruitzicht G. M. Co., Ltd.	16	—	1 4	1 2	1 2 8	4 6	1 7 1	10 2	4 6	4 3	10 5
City Deep, Limited.	68	68	1 6	0 45	1 5 55	3 10	6 87	—	5 2	1 77	3 78
Consolidated M. Reef M. & E., Ltd.	88	85	1 9	1 575	1 7 425	4 6	2 1 065	7 1	4 6	5 640	1 1 785
Crown Mines, Limited.	105	105	3 0	2 7	2 9 3	1 11	3 0 83	—	7 1	1 104	1 8 26
Durban Roodepoort Deep, Limited.	66	66	1 9	1 575	1 7 425	4 6	2 1 065	—	4 6	5 640	1 1 785
East Rand Prop. Mines, Limited.	68	69	1 9	1 575	1 7 425	4 6	2 1 065	—	4 6	5 640	1 1 785
Modderfontein East, Ltd.	53	34	1 6	1 35	1 4 65	4 6	1 9 48	8 0	4 6	4 83	11 82
Pretoria Portland Cement Co. Ltd.	92	—	1 9	1 40175	1 7 59825	4 6	2 1 28806	16 11	4 6	5 68981	1 1 90844
Rand Mines, Limited.	101	101	3 0	2 7	2 9 30	4 6	3 6 97	—	4 6	9 67	11 63
Transvaal Con. Land & Ex. Co., Ltd.	31	31	1 9	1 575	1 7 425	4 6	2 1 065	5 4	4 6	5 640	1 1 785
*Transvaal Gold M. Ests., Ltd.	86	86	9	0 675	8 325	3 4	9 99	—	5 8	2 831	5 494

†This rate also applies to dividend No. 91, paid on August 8, 1953.

Where no figure is shown in Column No. 9, the rates of South African taxation applicable in the £ cannot yet be ascertained, as they are dependent on the final particulars of the South African taxation of the companies concerned which are not yet available.

PAYMENT OF COUPONS

COUPONS presented for payment at the Office of the London Secretaries will, unless accompanied by Inland Revenue declarations, be paid at the rates shown in Column No. 12, which are arrived at after deduction of United Kingdom income tax (Column No. 11), at rates reduced to allow of relief in respect of Dominion taxes (Column No. 10). If accompanied by Inland Revenue declarations, they will be paid at the rates shown in Column No. 6. They must be left at least four clear days for examination and may be presented any day (Saturdays excepted) between the hours of 11 and 2. Depositors will be notified at the time of deposit when the cheques will be ready. LISTING FORMS may be had on application.

COUPONS presented at the Crédit Lyonnais, Paris, will be subject to the deduction of French income tax from the amounts of the dividends shown in Column No. 6.

Note: The Companies have been asked by the Commissioners of Inland Revenue to state:—

Under the provisions of Section 348 and the 17th Schedule of the Income Tax Act, 1952, as amended by Section 26 of the Finance Act, 1953, relating to "unilateral relief" from double taxation, South African tax applicable to the dividends is allowable as a credit against the United Kingdom tax payable in respect of the dividends. The deduction of tax at the reduced rates in the £ (Column No. 10) instead of at the Standard Rate of 9s. 0d. in the £ represents a provisional allowance of credit at the rates shown in Column No. 7. The final rate of credit allowable to a particular shareholder depends on his personal rate of tax and may be more or less than the rates shown in Column No. 7. Revision of the credit involves corresponding adjustments of the gross amounts of the dividends for United Kingdom tax purposes (Column No. 8).

THE GROSS AMOUNT OF THE DIVIDEND, PER SHARE, TO BE INCLUDED IN ANY STATEMENT OF TOTAL INCOME FOR UNITED KINGDOM INCOME TAX PURPOSES IS SHOWN IN COLUMN No. 8.

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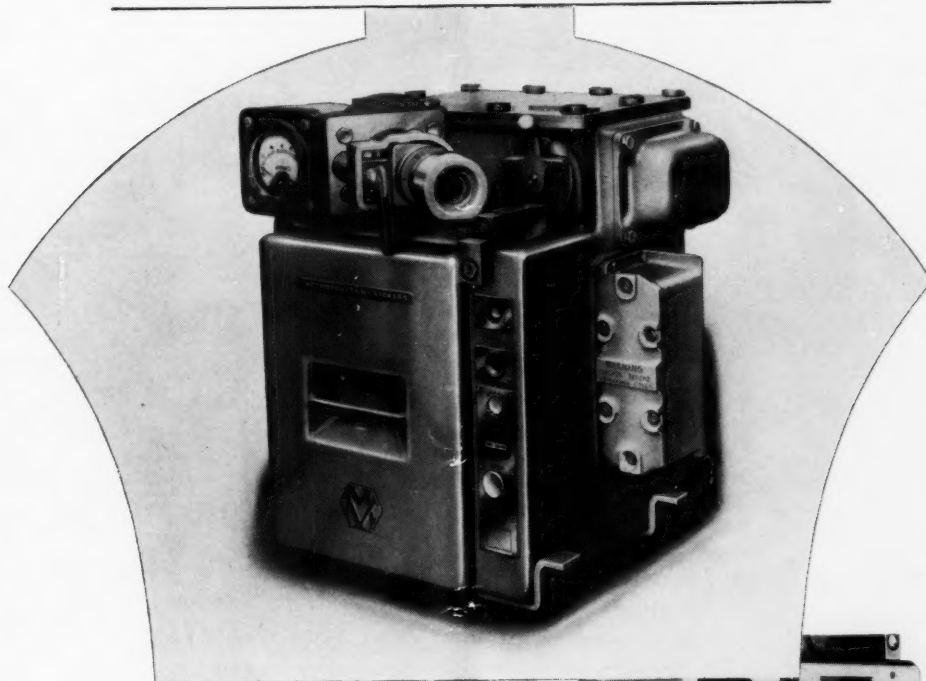
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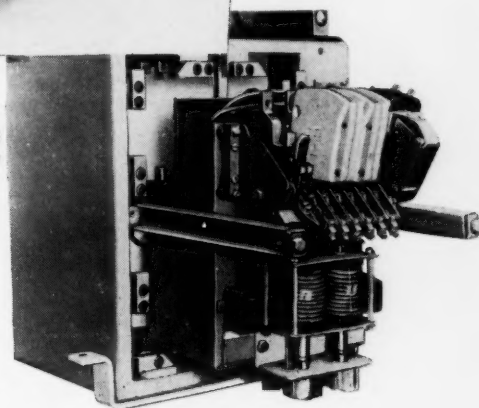
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